Honors Chemistry Chapter 10 Review/Study Guide **Name** KEY

1. I can define the following:

hydrate - AN IONIC COMPOUND WITH WATER "BUILT-IN" TO THE CRYSTAL STRUCTURE

empirical formula – LOWEST WHOLE # RATIO OF ATOMS IN A COMPOUND

molecular formula – TRUE (ACTUAL) RATIO OF ELEMENTS IN A COMPOUND

stoichiometry - THE STUDY OF QUANTITATIVE RELATIONSHIPS DERIVED FROM CHEMICAL FORMULAS

2. I can convert and show all work to find each of the following:

a. 3.00 moles of hydrogen chloride to grams

$$\frac{3.00\ \text{mol HCl}}{1} \times \frac{36.5\ \text{g HCl}}{1\ \text{mol HCl}} = \boxed{109.5\ \text{g HCl}}$$

b. 76 L of Oxygen to molecules

$$\frac{76\ \text{L } O_2}{1} \times \frac{1\ \text{mol } O_2}{22.4\ \text{L } O_2} \times \frac{6.02\times10^{23}\ \text{molecule } O_2}{1\ \text{mol } O_2} = \boxed{2.0\times10^{24}\ \text{molecule } O_2}$$

c. 1.204×10^{24} formula units of Calcium Fluoride to grams

$$\frac{1.204\times10^{24}\ \text{FORMULA UNITS } CaF_2}{1} \times \frac{1\ \text{mol } CaF_2}{6.02\times10^{23}\ \text{FORMULA UNITS } CaF_2} \times \frac{78.1\ \text{g } CaF_2}{1\ \text{mol } CaF_2} = \boxed{156\ \text{g } CaF_2}$$

d. 10.0 Liters of Dinitrogen Trioxide: total atoms, atoms of O and atoms of N

1) $\frac{10.0\ \text{L } N_2O_3}{1} \times \frac{1\ \text{mol } N_2O_3}{22.4\ \text{L } N_2O_3} \times \frac{6.02\times10^{23}\ \text{molecule } N_2O_3}{1\ \text{mol } N_2O_3} \times \frac{5\ \text{ATOMS}}{1\ \text{molecule } N_2O_3} = \boxed{1.34\times10^{24}\ \text{TOTAL ATOMS}}$ (① ② ③)

2) (From ①) → $\frac{1.34\times10^{24}\ \text{TOTAL ATOMS}}{1} \times \frac{5\ \text{ATOMS O}}{5\ \text{ATOMS TOTAL}} = \boxed{8.06\times10^{23}\ \text{ATOMS O}}$ ③ SAME FORMAT AS ② BUT RATIO = $\frac{2\ \text{ATOMS N}}{5\ \text{ATOMS TOTAL}}$

3. I can calculate and show all work to find the % composition of the following compounds:

a. Potassium Sulfate K_2SO_4

K 2 × 39.1
S 1 × 32.1
O 4 × 16.0
mm = 174.3 g

K | $\frac{78.2}{174.3} \times 100 = \boxed{44.8\%}$

S | $\frac{32.1}{174.3} \times 100 = \boxed{18.4\%}$

O | $\frac{64.0}{174.3} \times 100 = \boxed{36.7\%}$

b. Ammonium Oxide $(NH_4)_2O$

N 2 × 14.0
H 8 × 1.0
O 1 × 16.0
mm = 52.0 g

N | $\frac{28.0}{52.0} \times 100 = \boxed{53.8\%}$

H | $\frac{8.0}{52.0} \times 100 = \boxed{15.4\%}$

O | $\frac{16.0}{52.0} \times 100 = \boxed{30.8\%}$

4. I can calculate and show all work to find the empirical formula of both of the following:

   a. A compound contains 32.6 grams of Arsenic and 17.4 grams of Oxygen

As | 32.6 / 74.9 = 0.44 / 0.44 = (1) O | 17.4 / 16.0 = 1.1 / 0.44 = (2.5)

DOUBLE BOTH!

NOT $AsO_{2.5}$ | HAVE TO X 2 = As_2O_5

   b. A compound contains 60.0 % C, 13.3 % H, and the remaining % Oxygen.

C | 60 / 12.0 = 5 / 1.7 ≈ (3) H | 13.3 / 1.0 = 13.3 / 1.7 ≈ (8)

O | 26.7 / 16.0 = 1.7 / 1.7 = (1)

C_3H_8O

5. I can calculate and show all work to find the molecular formula of the following:

A compound is decomposed and found to have 85.7 % Carbon and 14.3 % Hydrogen.
If the molar mass = 42.0 g/mole, what is the molecular formula?

C | 85.7 / 12.0 = 7.14 / 7.14 = (1) H | 14.3 / 1.0 = 14.3 / 7.14 = (2)

EMPIRICAL

NOT CH_2 ... mm = 14.0 g/mole

MOLECULAR

IT MUST BE 3 TIMES THAT RATIO SO mm = 42.0 ... C_3H_6

6. I can interpret the formula of an atom/molecule based upon written and unwritten implications:

   Write the formula for each of the following (choose either O_2 or O for each):

Oxygen gas (implied):	O_2
An atom of oxygen:	O
A molecule of oxygen:	O_2
22.4L of oxygen (implied):	O_2
Compound contains 7% oxygen:	O
Oxygen we breathe (implied)	O_2